

Meteorology 5970

Topics in Atmospheric Radiation
Spring 2016

Instructor: Dave Turner

Office Hours: By appointment

Email: dave.turner@noaa.gov

Course description:

Radiative transfer is an essential component of all weather and climate models, and is the basis for most remote sensing techniques. This course will delve into a variety of topics to broaden your expertise with radiative processes and radiative transfer. It will be project centric course, with each project entailing a fair amount of programming to help illuminate you to the beauty that is radiative transfer.

Course materials:

It is expected that you have the material in Grant Petty's "*A First Course in Atmospheric Radiation*" well in-hand. I will draw heavily from other radiative transfer texts such as Liou's "*An Introduction to Atmospheric Radiation*", Thomas and Stamnes' "*Radiative Transfer in the Atmosphere and Ocean*", Graeme Stephens' "*Remote Sensing of the Lower Atmosphere: An Introduction*" (which is only available through the library), and others. I highly encourage you to use these texts to supplement what we discuss in class. I will not be handing out notes (as you are expected to take notes from the lectures), but any slides I show in class will be made available after the lecture.

Grading:

This class is project centric, as I believe that expertise is gained by doing things. You will need to have good skills with a scientific programming language (C/Fortran, IDL/matlab, python, etc). Each student will have to give a presentation at the end of the semester; the details will be shared in class around the mid-term.

The grades will be distributed as:

Project 1: 10%

Project 2: 35%

Project 3: 10%

Project 4: 10%

Project 5: 10%

Final Presentation: 25%

Topics covered:

General review of RT basics, IR RT with no scattering, single particle scattering, scattering by distribution of particles and internal/external mixtures, Monte Carlo RT, line spectroscopy and line-by-line RT models, scattering algorithms, radiation in climate and weather models, spectral radiance instrumentation, retrieval methods, satellite remote sensing, radiative heating rate profiling, lidar remote sensing.